REMARKS

Reconsideration of the pending application is respectfully requested on the basis of the following particulars.

1. In the claims

As shown in the foregoing LIST OF CURRENT CLAIMS, the claims have been amended to more clearly point out the subject matter for which protection is sought.

A. Claim Amendments

Claims 1 and 12 are amended to clearly set forth that the solid solution formation elements are selected from identified group of the viable solid solution formation elements. It is respectfully submitted that no new matter is added.

Claims 11, 18, 27, and 28 are left unchanged.

Entry of the LIST OF CURRENT CLAIMS is respectfully requested in the next Office communication.

B. Objection to claims 1 and 12

Reconsideration of this objection is respectfully requested, in view of the amendment to claims 1 and 12, on the basis that the claims have been amended in accordance with the Examiner's instructions.

Accordingly, removal of this objection is respectfully requested.

2. Rejection of claims 1, 11, and 27 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 6,764,770 (*Paranthaman et al.*) in view of U.S. publication no. 2004/0157747 (*Chen et al.*)

This rejection is respectfully traversed on the basis that the rejection fails to establish a *prima facie* case of obviousness with respect to amended claim 1, from which claims 11 and 27 depend.

By way of review, amended claim 1 requires, at least in part, an intermediate layer formed by sequentially disposing onto a metal substrate a first intermediate cerium-based oxide layer and a second intermediate cerium-based oxide layer. The second intermediate cerium-based oxide layer is different from the first intermediate cerium-based oxide layer. The first intermediate cerium-based oxide layer includes cerium and a solid solution formation element selected from the group consisting of Y, Nd, Sm, Gd, Eu, Yb, Ho, Tm, Dy, La and Er, while the second intermediate cerium-based oxide layer includes cerium and a charge compensation element selected from the group consisting of Bi, Nb, Sb, Ta and V. The total of the solid solution formation element and the charge compensation element in the intermediate layers is 5 to 60 mol% in terms of the metal content.

As discussed in detail in the specification, the charge compensation element in an intermediate layer compensates for a charge mismatch created due to a difference between the electron valences of respective ions of Ce and the solid solution formation element and inhibits an ion diffusion in the oxide film (page 13, lines 16-23). The charge compensation element, by having a charge of +5 for example, helps improve the Tc by preventing a Ni element from diffusing into a superconductive layer (page 23, lines 4-9).

It is respectfully submitted that the proposed combination of the *Paranthaman* patent and the *Chen* publication fails to teach or disclose the second intermediate cerium-based oxide layer as containing a charge compensation element as recited in amended claim 1.

Turning to the *Paranthaman* patent, the Office action asserts on page 3 that claim 6 and Figure 1b of the *Paranthaman* patent discloses "a rare earth superconductor device comprising a metal substrate, an intermediate buffer layer containing an oxide of Mn along with at least one element of Ce, Y, Nd, Sm, Gd, Eu, Yb, Ho, Tm, Dy, and Er, a cerium oxide layer, and a surface layer of $REBa_2Cu_3O_7$ (e.g., YBCO)." The *Paranthaman* patent further suggests that the new and improved materials and methods

for depositing buffer layer substrates comprise of $RMnO_3$, $R_{1-x}A_xMnO_3$, and combinations thereof, where R is La, Ce,… and Y, and A is selected from the group consisting of Be, Mg, Ca, Sr, Ba, and and Ra (column 2, line 62 to column 3, line 6). However, it is respectfully submitted that the *Paranthaman* patent is suggesting that Manganese is an indispensible element in the first intermediate oxide layer and thus would not contain a charge compensation element. In other words, the LMO layer itself would prevent diffusion and would not require a charge compensation element and would in fact be used to replace both the YSZ and CeO_2 layers (column 1, lines 58-67).

Meanwhile, the Office action dated August 31, 2010 on page 3-4 suggests that the *Chen* publication discloses a superconducting product comprising a metallic substrate, a high Tc superconductor layer, and doped metal oxide buffer layer in claim 1 and paragraph [0041]. The buffer layer is defined to comprise cerium oxide doped with possibly a transition metal oxide, e.g., Nb, Ta, or V, a lanthanide metal oxide, e.g., Sm_2O_3, Y_2O_3, or Gd_2O_3, or combinations thereof. However, it is respectfully submitted that the *Chen* publication does not teach or disclose including a charge compensation element in the buffer layers.

In fact, it is respectfully submitted that there is no teaching or suggestion in either the *Paranthaman* patent or the *Chen* publication of the second layer containing a charge compensation element. The charge compensation element, as recited in claim 1, has a charge of +5 to help improve the Tc by preventing a Ni element from diffusing into the different layers.

Meanwhile, the proposed combination of the *Paranthaman* patent and the *Chen* publication would at most only disclose a rare earth oxide superconductor having cerium oxide intermediate layers where the layers are doped with metal oxides from the transition metals, group 2, IIA or lanthanide metal oxides. However, the unique combination as recited in claim 1 allows the charge differences between the different layers, i.e., the difference in the electron valences between the cerium and solid solution

formation elements and charge compensation elements that compensate for the charge mismatch between the electron valences of the cerium ions and the solid solution formation elements in the different layers, inhibits ion diffusion.

On the other hand, the proposed combination of the layers as disclosed in the *Paranthaman* patent with the layers as disclosed in the *Chen* publication would not prevent such diffusion since the charges between the layers would not compensate for the ion diffusion. In fact, *Paranthaman* suggests replacing the CeO2 and YSZ layers with a LMO layer where the single LMO layer provides a barrier against Ni diffusion, while the *Chen* publication only discloses improving the match between the thermal expansion and lattice parameters of the different layers.

Thus, it is respectfully submitted that even if the *Paranthaman* patent and the *Chen* publication are properly combinable, one having ordinary skill in the art would not have been led to a rare earth oxide superconductor that has one layer comprising cerium and a solid solution formation element and a second layer comprising cerium and a charge compensation element that compensates for a charge mismatch between the electron valences of the cerium and the solid solution formation element as required by claim 1. In other words, the *Paranthaman* patent discloses that the LMO layer itself provides a sufficient barrier against Ni diffusion; therefore, one having ordinary skill in the art would not have modified the different layers as disclosed in either cited prior art so that the electron valences between the layers would have been compensated as recited in claim 1, since the prior art documents already sufficiently prevent Ni diffusion.

Moreover, it is respectfully submitted that the *Paranthaman* patent and the *Chen* publication are not properly combinable. As disclosed in the *Paranthaman* patent, the use of lanthanum manganate (LMO) as the buffer layer has considerable advantages over a buffer layer of cerium oxide. Although the *Paranthaman* patent discloses that the LMO layer may contain cerium oxide, it is respectfully submitted that a buffer layer containing cerium oxide is different than a "buffer" layer of cerium oxide.

Specifically, the *Paranthaman* patent discloses that LMO provides a barrier against Ni diffusion and can be used as a single buffer layer. The LMO layer also appears to exhibit a reduced reactivity toward the BF precursor during ex situ anneal, allowing the easier formation of epitaxial high $-J_c$ YBCO layers (column 1, lines 49-67). This layer is created by growing LMO from MgO crystals.

However, it is respectfully submitted that this growth process is different from the growth process of cerium based oxide layers. Therefore, one having ordinary skill in the art could not simply modify the buffer layer as disclosed in the *Paranthaman* patent with the features as disclosed in the *Chen* publication, which discloses cerium based oxide layers, to achieve the features as recited in claim 1, since the process to create the oxide layers are different and would require extensive modification to create such different layers.

Lastly, it is respectfully submitted that amended claim 1 recites that the total of the solid solution formation element and the charge compensation element in the intermediate layers is 5 to 60 mol%.

It is respectfully submitted that the combination of the *Paranthaman* patent and the *Chen* publication does not teach or disclose the total metal content in both layers to be 5 to 60 mol%.

At most, the *Chen* publication discloses the concentration of Samarium in the single buffer layer to be from about 0.01 to 0.35, while the *Paranthaman* patent is silent to respective concentrations.

As discussed above in detail, it is respectfully submitted the total of the solid solution formation element and the charge compensation element in the intermediate layers is 5 to 60 mol% to help compensate for the valence difference between the solid solution formation element and the cerium. If the superconductor did not have the proper charge compensation element in the intermediate layer, diffusion of the positive ions,

such as Ni, would occur between the layers. However, by having a total of the solid solution element and the charge compensation element in both layers between 5 and 60 mol%, the diffusion between the layers can be prevented.

It is respectfully submitted that one having ordinary skill would not then modify the concentration of the Samarium as disclosed in the *Chen* publication to compensate for the difference in valences in a first intermediate layer. This varying of the mol% would require extensive experimentation; therefore, one having ordinary skill in the art could not simply substitute the claimed ranges as recited in amended claim 1 in view of the teachings of the *Paranthaman* patent and the *Chen* publication.

Accordingly, a *prima facie* case of obviousness cannot be established with respect to amended claim 1, from which claims 11 and 27 depend, and withdrawal of this rejection is respectfully requested.

3. Rejection of claims 12, 18, and 28 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 6,764,770 (*Paranthaman et al.*) in view of U.S. publication no. 2004/0157747 (*Chen et al.*) and further in view of U.S. patent no. 5,444,040 (*Kojima et al.*)

This rejection is respectfully traversed on the basis that the rejection fails to establish a *prima facie* case of obviousness with respect to amended claim 12, from which the remaining claims 18 and 28 depend.

The method recited in claim 12 includes the features recited in claim 1, and discussed above in detail. In particular, claim 12 requires, at least in part, an intermediate layer formed by sequentially disposing onto a metal substrate a first intermediate cerium-based oxide layer and a second intermediate cerium-based oxide layer. The second intermediate cerium-based oxide layer is different from the first intermediate cerium-based oxide layer, where the first intermediate cerium-based oxide layer includes cerium and a solid solution formation element selected from the group consisting of Y, Nd, Sm,

Gd, Eu, Yb, Ho, Tm, Dy, La and Er and the second intermediate cerium-based oxide layer includes cerium and a charge compensation element selected from the group consisting of Bi, Nb, Sb, Ta and V.

The deficiencies of the *Paranthaman* patent and *Chen* publications are discussed above in detail with respect to claim 1, and are equally applicable here.

It is respectfully submitted that the *Kojima* patent fails to provide for the shortcomings of the *Paranthaman* patent and the *Chen* publication, as discussed above in detail with respect to claim 1.

Therefore, a *prima facie* case of obviousness cannot be established with respect to claim 12, from which claims 18 and 28 depend, and withdrawal of this rejection is respectfully requested.

4. Conclusion

As a result of the amendment to the claims, and further in view of the foregoing remarks, it is respectfully submitted that the application is in condition for allowance. Accordingly, it is respectfully requested that every pending claim in the present application be allowed and the application be passed to issue.

Please charge any additional fees required or credit any overpayments in connection with this paper to Deposit Account No. 02-0200.

If any issues remain that may be resolved by a telephone or facsimile communication with the applicants' attorney, the examiner is invited to contact the undersigned at the numbers shown below.

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Respectfully submitted,

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